



**SOUTHWEST GAS CORPORATION**

NEW APPLICATION  
ORIGINAL



September 30, 2009

Docket Control Office  
Arizona Corporation Commission  
Utilities Division  
1200 West Washington Street  
Phoenix, AZ 85007

G-01551A-09-0474

**Re: Application of Southwest Gas Corporation to Continue Its Technology  
Information Center Demand Side Management Program**

Southwest Gas Corporation (Southwest), pursuant to Decision No. 70526, herewith submits for filing and approval an original and thirteen (13) copies of the aforementioned Application.

If you have any questions or comments on the attached report, please do not hesitate to contact me at 702-876-7163.

Respectfully submitted,

*Debra S. Gallo by cmg*

Debra S. Gallo, Director  
Government & State Regulatory Affairs

Enclosures

c: Mr. Ernest Johnson, ACC  
Compliance Section, ACC  
Mr. Janice Alward, ACC  
Ms. Barbara Keene, ACC  
Ms. Julie McNeely-Kirwan, ACC  
Ms. Jodi Jerich, RUCO

Arizona Corporation Commission

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1                   **BEFORE THE ARIZONA CORPORATION COMMISSION**

2                   **COMMISSIONERS**

3                   KRISTIN K. MAYES, Chairman  
4                   GARY PIERCE  
5                   PAUL NEWMAN  
6                   SANDRA D. KENNEDY  
7                   BOB STUMP

8                   IN THE MATTER OF THE  
9                   APPLICATION OF SOUTHWEST GAS  
10                  CORPORATION FOR CONTINUANCE  
11                  OF ITS TECHNOLOGY INFORMATION  
12                  CENTER DEMAND SIDE  
13                  MANAGEMENT PROGRAM

DOCKET NO. G-01551A-08- \_\_\_\_\_

**APPLICATION**

14                   **APPLICATION TO CONTINUE THE TECHNOLOGY INFORMATION CENTER**  
15                   **DEMAND SIDE MANAGEMENT PROGRAM OF**  
16                   **SOUTHWEST GAS CORPORATION**

17                   **Introduction**

18                   1.       Southwest Gas Corporation ("Southwest" or "Company"), pursuant to Decision No.  
19                   70526, hereby submits its application to the Arizona Corporation Commission ("Commission" or  
20                   "ACC") respectfully requesting continuance of its Technology Information Center Demand Side  
21                   Management Program ("TIC Program").

22                   2.       Southwest is a corporation duly organized and validly existing under the laws of the  
23                   state of California and is qualified to transact intrastate business and is in good standing under the  
24                   laws of the state of Arizona. Southwest is engaged in the retail transmission, distribution,  
25                   transportation, and sale of natural gas for domestic, commercial, agricultural, and industrial uses to  
approximately 1.8 million customers in the states of Arizona, California, and Nevada. Southwest's  
corporate offices are located at 5241 Spring Mountain Road, P.O. Box 98510, Las Vegas, Nevada  
89193-8510.

1           3.       Southwest is a public utility in the state of Arizona and is subject to the  
2 Commission's jurisdiction with respect to its prices and terms of natural gas service to retail  
3 customers in Arizona pursuant to the applicable sections of Article XV of the Arizona Constitution  
4 and the applicable chapters of Title 40 of the Arizona Revised Statutes. Southwest currently  
5 provides natural gas service to approximately 980,000 customers in ten counties in the state of  
6 Arizona, including Cochise, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Pima, Pinal, and  
7 Yuma.

8           4.       Communications regarding this filing should be addressed to:

9  
10           Justin Lee Brown, Esq.  
11           Assistant General Counsel  
12           Southwest Gas Corporation  
13           P.O. Box 98510  
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              Demand Side Management  
              Southwest Gas Corporation  
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              E-mail: [bobbi.sterrett@swgas.com](mailto:bobbi.sterrett@swgas.com)

#### 14       **Background**

15           5.       Southwest's TIC Program is designed primarily for the Company's large  
16 commercial, industrial and transportation-eligible customers ("Large Customers"),<sup>1</sup> a group that can  
17 invariably be difficult to reach with routine energy efficiency targeted communications.  
18 Participants of the TIC Program receive a monthly electronic newsletter containing technical  
19 information on energy-saving equipment and processes to enable them to make informed energy  
20 and environmental decisions.  
21  
22  
23  
24  
25

---

<sup>1</sup> Customers who are served under Southwest's Large General, Transportation-Eligible, Optional, Gas Air-Conditioning, Electric Generation, or Natural Gas Engine Gas Service Tariffs.

1           6.       The Commission originally approved the Company's TIC Program as part of  
2 Commission Decision No. 69667 in Docket No. G-01551A-0876. The initial approval of the  
3 program was limited to a pilot program.

4           7.       Southwest filed for approval of a three-year continuation of the program July 31,  
5 2008. The Commission approved Southwest's request to continue the TIC Program September 30,  
6 2008 in Decision No. 70526, but limited the approval to a one-year pilot program. In accordance  
7 with Decision No. 70526, Southwest hereby requests to continue the TIC Program for a period of  
8 three years. Southwest hereby requests that it be allowed to continue the existing TIC Program as  
9 approved in Decision No. 70526 through the transition period between the application filing date  
10 and the date the Commission acts upon this Application, to avoid customer dissatisfaction and  
11 disruption of the program.  
12

13 **Request to Continue TIC Program**

14           8.       Participants of the TIC Program receive a monthly electronic newsletter containing  
15 technical information on energy-saving equipment and processes to enable them to make informed  
16 energy and environmental decisions. Features of the newsletter include the "Ask an Expert"  
17 hotline, complimentary energy consultation with Southwest's Key Account Managers (KAM), an  
18 electronic research library and a link for more information about Southwest's energy-efficiency  
19 programs.  
20

21           9.       The KAM and Conservation/Demand Side Management departments use an  
22 administrative feature made available by Questline, the administrator of the newsletter, to track  
23 customer interest in various topics and use it as a tool to aid in the development of future programs.

24           10.      During the last year, Southwest made some minor changes to the newsletter,  
25 including changing its name to *Energy Line* and added an editorial calendar including articles that

1 focus on energy efficiency, conservation, and other related topics of interest to the Company's  
2 Large Customers. A more detailed description of the program is attached hereto as Attachment 1.

3 11. The newsletter continues to promote Southwest's demand-side management  
4 programs designed for commercial and industrial customers.<sup>2</sup> Newsletter stories published during  
5 the past program year included the following subjects: developing a master plan for energy  
6 management, heat recovery in commercial and institutional buildings, commercial kitchen energy  
7 efficiency, and green building practices.

8 12. In accordance with Decision No. 70526, the Company performed bill comparisons of  
9 a sampling of active customers that receive the monthly newsletter. In comparing the annual therm  
10 usage from 2007, 2008, and 2009, the results indicate a downward trend in usage. However,  
11 Southwest is unable to determine if the decline in energy usage is directly related to these customers  
12 receiving and implementing the tools and resources provided within the newsletter. Southwest  
13 recognizes that the current economic conditions have likely contributed to the decreased usage as  
14 production output has slowed down for many Large Customers, resulting in less use of natural gas  
15 to manufacture products.<sup>3</sup>

17 13. In accordance with Decision No. 70526, Southwest's annual survey was distributed  
18 to *Energy Line* customers in 2009. The results of the most recent survey are summarized in the  
19 attached program description and the complete survey and results are included in Appendix B to the  
20 program description. The survey results clearly demonstrate the value of *Energy Line* to  
21 Southwest's Large Customers, and speak to the desirability of continuing the TIC Program.  
22  
23  
24

25 <sup>2</sup> Please refer to Appendix A for three samples of *Energy Line*, as ordered in Decision No. 70526.

<sup>3</sup> Please refer to Appendix C of the program description for bill comparison data.

1           14.     The survey results indicate the newsletter has made a positive impact on Southwest's  
2 customers, although it is impossible to measure direct energy savings related to the publication.  
3 Gathering feedback from recipients is part of the evaluation process. All of the survey respondents  
4 indicated that they find the newsletter somewhat or very valuable. Additionally, eighty percent of  
5 those respondents forward the information on to others that are involved in the energy management  
6 decision making process. Southwest believes this feedback demonstrates the value of the newsletter  
7 and further demonstrates that readers are making educated energy decisions, which benefit all  
8 Southwest customers and citizens of Arizona. Due to the positive results received from the survey,  
9 Southwest made the decision to seek approval to continue the program.  
10

11           15.     The current annual budget for the TIC Program is \$35,000. As explained in more  
12 detail in the attached program description, Southwest proposes to lower the budget to \$15,000  
13 annually for the next three program years. This decrease will more accurately reflect the annual  
14 cost of the program.

15           16.     Considering the value of the TIC Program to Southwest's Large Customers, and its  
16 relatively low cost, the Company recommends a three-year continuation of the program at the  
17 funding level of \$15,000 annually. Southwest hereby requests to continue its TIC Program for a  
18 period of three years or until December 31, 2012, whichever occurs later.

19           17.     Southwest requests this Application supersede and replace the TIC Program section  
20 of its proposal submitted June 9, 2009.

21  
22 **Summary and Conclusion**

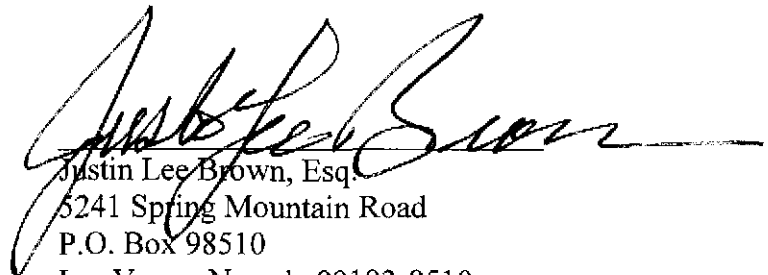
23           18.     Due to the positive results received from the survey with regard to the TIC Program,  
24 the open communication established by the "Ask the Expert" hotline with Southwest's large  
25 commercial, industrial and transportation-eligible customers and other program benefits, as

1 mentioned above and as outlined in more detail in the enclosed program description, Southwest  
2 hereby requests the Commission's approval to continue its TIC Program for a period of three years.  
3 Southwest believes the ongoing feedback and data tracked through this program will assist in  
4 determining the types of energy-efficient measures that would be of further interest to Large  
5 Customers and could then be evaluated as potential future DSM programs.

6 19. Based upon the foregoing, Southwest respectfully requests that the Commission  
7 issue an order authorizing Southwest to continue its TIC Program, at an annual funding level of  
8 \$15,000, for a period of three years or until December 31, 2012, whichever occurs later.  
9

10 DATED this 28 day of September 2009.

11 Respectfully submitted by,  
12 SOUTHWEST GAS CORPORATION

13   
14 Justin Lee Brown, Esq.  
15 5241 Spring Mountain Road  
16 P.O. Box 98510

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19 Facsimile No. (702) 252-7283  
20 E-mail: [justin.brown@swgas.com](mailto:justin.brown@swgas.com)

21 *Attorney for Southwest Gas Corporation*  
22  
23  
24  
25

# **Attachment 1**





**SOUTHWEST GAS CORPORATION**

**ARIZONA**

**TECHNOLOGY INFORMATION  
CENTER**

**DEMAND SIDE MANAGEMENT  
PROGRAM**

**October 1, 2009**

# **TECHNOLOGY INFORMATION CENTER**

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### **APPENDICES**

- A – Sample Newsletter
- B – Survey Results
- C – Bill Comparison Data

# PROGRAM OVERVIEW

## Program Description

The Arizona Corporation Commission (ACC or Commission) approved Southwest Gas Corporation's (Southwest or the Company) Technology Information Center (TIC) program as a pilot program on June 28, 2007, in Decision No. 69667. Southwest filed for approval of a three-year continuation of the program on July 31, 2008. On September 30, 2008, the Commission approved Southwest's TIC program for an additional year as another pilot program in Decision No. 70526. This program is designed primarily for Southwest's large commercial, industrial and transportation-eligible customers, a widely-varying group that can be particularly difficult to reach with routine customer communications regarding energy efficiency. Participants receive a monthly electronic newsletter containing technical information on energy-saving equipment and processes to enable them to make informed energy and environmental decisions. Features include the "Ask an Expert" hotline, complimentary energy consultation with Southwest's Key Account Managers (KAM), an electronic research library and a link for more information about Southwest's energy-efficiency programs. The KAM and Demand Side Management (DSM) departments use an administrative feature made available by Questline, the administrator of the newsletter, to track customer interest in various topics and use it as a tool to aid in the development of future DSM programs.

## Program Update

After the TIC program received approval as a DSM program, Southwest took several steps to ensure its value as a DSM tool for its large Arizona customers. DSM held informational meetings with Questline and Key Account Managers to update them on the DSM aspects of the program, and reacquaint them with the wide variety of tools available through the newsletter service. Southwest also changed the name of the newsletter to *Energy Line* and created an editorial calendar including articles that focus on energy efficiency, conservation, and other related topics of interest to the Company's large customers (those customers who are served under Southwest's Large General, Transportation-Eligible, Optional, Gas Air-Conditioning, Electric Generation, or Natural Gas Engine Gas Service Tariffs). Newsletter stories published during the past program year included the following subjects: developing a master plan for energy management, heat recovery in commercial and institutional buildings, commercial kitchen energy efficiency, and green building practices. The newsletter continued to promote Southwest's DSM programs designed for commercial and industrial customers. Articles ran in December 2008 and April 2009 for the Distributed Generation/Combined Heat and Power program and Commercial Equipment program, respectively. Please refer to Appendix A for three samples of *Energy Line*, as ordered in Decision No. 70526.

In conjunction with Questline, Southwest developed an online survey for readers of *Energy Line* to determine its value in making energy decisions, among other objectives. The survey was approved by ACC Staff in 2008, as required in Decision No. 69667, and implemented in February of that year. This annual survey was distributed again to Southwest's *Energy Line* customers in 2009, as ordered in Decision No. 70526. The results of the most recent survey are summarized below. The complete survey and results are included in Appendix B. Due to the positive results received from the survey, Southwest made the decision to seek approval to continue the program in its June 2009 submittal to the Commission.

## **Survey Summary**

In February and March of 2009, surveys were e-mailed to 140 Arizona recipients, with a total of 23 completed surveys returned within two weeks. One hundred percent (100%) of respondents find the *Energy Line* "somewhat valuable" or "very valuable," and one hundred percent (100%) find the information "somewhat helpful" or "very helpful" in making energy decisions, with eighty percent (80%) passing the information on to others involved in making energy decisions. Energy pricing forecasts and green energy/alternative energy received the highest interest ranking, with energy management and energy-saving technologies a close second. Approximately fifty two percent (52.2%) have taken steps to improve energy-efficiency as a result of information provided in *Energy Line*. The greatest interest in energy-efficiency programs was for equipment replacement (21.5%), followed by peak shaving (16.9%) and combined heat and power (16.9%). Seventy-eight percent (78.3%) indicated interest in an energy consultation from Southwest, with eighty-three percent (83.3%) wanting it within six months or less.

This survey was distributed a second time in hopes of increasing the number of respondents. Southwest will continue to work with Questline to implement other means to increase customer responsiveness.

The survey results clearly demonstrate the value of *Energy Line* to Southwest's large customers, and speak to the desirability of continuing the Technology Information Center program.

## **Program Objectives and Rationale**

The program has various benefits for Southwest's large customers, including:

- Energy-saving and energy-efficiency ideas.
- Proactive environmental education.
- Current energy issues information.
- Communication with Southwest.

## **Products and Services Provided**

Southwest contracts with Questline, an energy newsletter provider, who sends a customized newsletter called *Energy Line* to Southwest's large customers every month. The Company submits recommendations for feature article ideas to Questline, as well as edits the newsletter's content prior to distribution. The goal is to ensure that the articles provide information on energy-savings and energy-efficiency equipment and strategies.

Recipients of the newsletter have the ability to provide feedback or ask questions related to the stories or information within the newsletters. The "Ask An Expert" hotline also addresses customer questions, even if unrelated to the newsletter content.

## **Opportunities**

The newsletters afford Southwest the opportunity to keep issues such as energy efficiency and DSM in the forefront of the Company's large customers every month.

The newsletters also introduce new technologies and provide information that is useful in corporate planning and budgets for large customers.

## **TARGET MARKET**

### **Customer Type**

The TIC program targets customers that are categorized under Southwest's Large General, Transportation-Eligible, Optional, Gas Air-Conditioning, Electric Generation, or Natural Gas Engine Gas Service tariffs. In addition, the newsletter is distributed to architects or engineers who express an interest in receiving the newsletter. The newsletter provides tools and resources to educate customers, which ultimately can have an impact on energy efficiency and DSM.

### **Program Eligibility Requirements**

While this program is intended for the Company's large customers, other non-residential customers may also receive it, if they express interest. In fact, any reader who receives the newsletter as a forwarded e-mail from a subscriber can sign up to receive it directly. It is important to note that the cost to Southwest is not affected by the number of customers to whom the newsletter is distributed nor their location.

### **Program Participation**

Southwest currently has 315 large commercial, industrial and transportation-eligible customers in Arizona who receive the newsletter via e-mail. As of August 2009, the website recorded approximately 704 hits. At the current time Southwest is satisfying its current 2009 participation goal of 300 customers, as ordered in Decision No. 70526.

Southwest requests the program be continued for three more program years. The estimated level of program participation in program years one, two and three reflects the number of potential customers, as follows:

Program Year One: 300 customers  
Program Year Two: 325 customers  
Program Year Three: 350 customers

## **ENERGY MEASURES**

Southwest does not have specific data regarding the types of equipment or the equipment efficiencies that are installed in response to the newsletter articles. This data varies by customer and is diverse in nature, and much of the information is proprietary to the customer. As such, a baseline energy analysis is not feasible.

Since the program is educational in nature, Southwest is unable to gather precise energy savings data. Notwithstanding, the Company believes that savings will occur as large customers increase their awareness of high-efficiency equipment and begin utilizing that equipment in their operations.

In accordance with Decision No. 70526, the Company performed bill comparisons of a sampling of active customers that receive the monthly newsletter. In comparing the annual therm usage from 2007, 2008, and 2009, the results indicate a downward trend in usage. Southwest is unable to determine if the decline in energy usage is directly related to these customers receiving and implementing the tools and resources provided within the newsletter. The current slow economic conditions have likely contributed to the decreased usage. Production output has slowed down for many large customers, resulting in less use of natural gas to manufacture products. Please refer to Appendix C for bill comparison data.

## **IMPLEMENTATION PLAN**

### **Marketing and Delivery Strategy**

The availability of the TIC Program is communicated to Southwest's large customers by Key Account Managers and Commercial Service Planners. Architects or engineers who express an interest in the newsletter may also receive the newsletter upon request. The target audiences could potentially communicate newsletter information to their clients.

## **MEASUREMENT AND EVALUATION**

This program is measured by the number of e-mail newsletters sent to customers, the percentage of readership, popularity of topics, the number of calls to the hotline, and the results of a value survey. The survey results referenced above indicate the newsletter has made a positive impact on Southwest's customers, although it is impossible to measure direct energy savings related to the publication. Gathering feedback from recipients is part of the evaluation process. All of the survey respondents indicated that they find the newsletter somewhat or very valuable. Additionally, eighty percent of those respondents forward the information on to others that are involved in the energy management decision making process. Southwest believes this feedback demonstrates the value of the newsletter and further demonstrates that readers are making educated energy decisions, which benefit all Southwest customers and citizens of Arizona.

## BUDGET

The current approved budget for this program is \$35,000 annually. Program funds are allocated through the Demand Side Management Adjuster Mechanism (DSMAM), as directed by the Commission.

The costs incurred during the 2009 program year are listed below. These costs reflect charges incurred from January 1, 2009 through August 30, 2009. The below expenses have been adjusted to remove a misallocated \$3,438 charge to the program; the expense adjustment will be reflected in Southwest's September 2009 accounting records.

Technology Information Center Expenses as of August 31, 2009			
Implementation	\$ 33,000	\$ 15,000	\$ 18,000
Administration	\$ 2,000	\$ 180	\$ 1,820
<b>Total</b>	<b>\$ 35,000</b>	<b>\$ 15,180</b>	<b>\$ 19,820</b>

Southwest proposes to lower the budget to \$15,000 annually for the next three program years. This decrease will more accurately reflect the annual cost of the program. Southwest originally requested the lower budget in its Proposal to Supplement and Modify the Arizona Demand Side Management Plan for Program Years 2009 and 2010 (Proposal) on June 9, 2009.

Technology Information Center Proposed Annual Budget	
Implementation	\$ 13,000
Administration	\$ 2,000
<b>Total</b>	<b>\$ 15,000</b>

## COST-EFFECTIVENESS TEST RESULTS

Because this program is educational in nature, Southwest does not have the data necessary to demonstrate cost-effectiveness test results. However, the Company believes that as energy issues continue to be of growing importance to society, the information distributed to these large customers will be read and taken into consideration. Ultimately, as companies replace equipment or undergo general remodeling, many of the DSM and energy efficiency measures advocated through the TIC program are likely to be implemented.

---

# Appendix A



## **APPENDIX A**

*EnergyLine* Newsletter



SOUTHWEST GAS

ENERGY LINE

a unique service for our commercial &amp; industrial customers

My Energy Line

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Newsletters

Tools You Can Use

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SOUTHWEST GAS

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## :: ALSO IN THIS ISSUE ::

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- [Success with Less: Companies Are Turning Waste Reduction into Profits](#)
- [Busted—Another Natural Gas Safety Myth Exposed](#)
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- [Employee Awareness Programs Save Energy](#)

## Leveling Those Electric Peak Demand Charges

## Key Points

- Peak demand charges can drive up energy costs, especially during the hot, humid summer months.
- Natural gas cooling and dehumidification technologies provide an efficient alternative for minimizing demand costs.
- Heat recovery is an added benefit that can improve overall facility energy efficiency.

Electric peak demand charges can drive up energy costs and give facility managers a headache. Natural gas is here to help. During the summer months when demand for electricity is peaking, natural gas usage is often at its lowest point. Efficient natural gas cooling and dehumidification technologies can help to reduce peak demand charges and stabilize the electric grid.



## How Peak Demand Impacts Your Energy Bill

High loads strain the electric grid, and customers are asked to share in the cost burden of chasing more expensive power. For most facilities, the cost of electricity is made up of two components, consumption in kilowatt-hours (kWh) and demand charges in kilowatts (kW). Many end users are surprised when kW demand capacity charges comprise as much as 50% of an electric bill. Demand meters record the rate of energy use over 15-minute time increments, and one energy intensive interval can result in a high demand charge applied over an entire month's electric bill.

In addition, a high peak demand capacity during one period can effect your energy bill over the course of the entire year. Many electric utilities employ what is known as a "ratchet clause" in their rate structure. In a ratchet scheme, the demand charge for each month is based on a percentage (typically 70% to 100%) of the highest recorded peak demand over the previous 12 months. Thus, a high peak demand level in July can increase your energy costs throughout the rest of the year.

Peak demand charges become a real problem when energy use is at its highest—such as during the summer when the addition of high air conditioning loads puts a real strain on the electric grid. With adequate air conditioning a necessity for building comfort and indoor air quality, many facilities find themselves stuck in an annual cycle of spiraling operating costs.

## Reduce Summer Peak Demand with Natural Gas Cooling

Natural gas cooling is one way out of this dilemma. During the summer, when electric demand charges are going up, natural gas prices are typically at their lowest. A gas heat pump (GHP) can help reduce operating costs by dramatically lowering electricity consumption and peak demand charges.



A new generation of GHPs is now available to heat and cool your space more efficiently, comfortably, and intelligently. It is one of the most efficient heating and cooling systems currently available. Today's GHPs use proven state-of-the-art Japanese technology that has been "Americanized" for optimum operation in the high ambient conditions of the southwestern United States. Since these GHPs have ducted and ductless capabilities, you will be able to enjoy design, architectural and construction flexibility never experienced before.

While the basic system for the heating and cooling cycles in a GHP is similar to an electric heat pump (EHP), there are several differences. The most important differences are:

- GHPs are able to capture and use the waste heat from its engine and exhaust just like a combined heat and power (CHP) system. With a GHP, the waste heat can be used to supplement space heating and, optionally, help with other thermal loads, such as domestic hot water.
- In a GHP, a natural gas fueled engine drives its compressors instead of an electric motor, as in an EHP. Since it uses about 80% less electricity than an EHP, users enjoy operating cost savings.
- GHPs require only one outdoor unit to service up to 33 zones, whereas conventional EHPs require an outdoor unit for every zone.

## Desiccants for Humidity Control

Many facilities—such as laboratories, supermarkets, ice arenas, hospitals, and many manufacturers—require lower humidity levels. For those with conventional cooling systems, the only option is to super chill the air—thus freezing out the moisture—and then reheating it. This is a very expensive process. Humidity control is also a problem in the summer months, which further exacerbates peak demand issues.

## Complimentary Energy Consultation

Interested in a free energy consultation from Southwest Gas? Please call your IGE or our hotline at 702-364-3063.



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Gas-fired desiccant dehumidification systems provide a simple solution to this problem by removing the moisture from the air before it is conditioned. Desiccant systems utilize special materials (desiccants) that—when thermally heated with natural gas—absorb moisture from incoming air. This allows the cooling unit to be set for optimum temperature, enabling the use of a smaller compressor and eliminating the need for excess chiller capacity. Together with a conventional air conditioning system, desiccant technology can help to optimize temperature and humidity control and lower cooling costs.

#### **Heat Recovery: An Added Benefit**

In addition to cutting peak demand charges, gas heat pump and dehumidification equipment can utilize waste heat, thus improving overall energy efficiency and reducing costs. For gas heat pumps, heat can be recovered from the engine to utilize in space conditioning and water heating.

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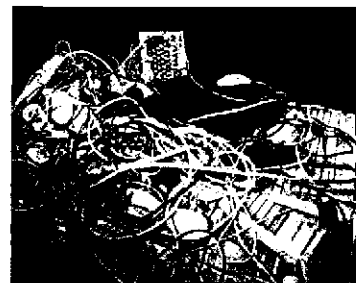
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**Success with Less: Companies Are Turning Waste Reduction into Profits**
**Key Points**

- A variety of organizations have achieved significant savings in materials purchasing and disposal costs through solid waste reduction.
- Packaging, pallets, office paper, and electronic equipment are some commonly-targeted waste streams.
- Successful strategies include packaging redesign and electronic internal and external communications.

Managing solid waste is a problem for any business or organization—often a costly one. Materials purchasing and disposal directly impacts the bottom line. Organizations across the country are using innovative strategies to purchase less, recycle more, and reduce waste disposal costs. Commonly-targeted waste streams include electronic equipment, packaging, wood pallets, office paper, and yard trimmings, as well as industrial wastes.

Over 1,700 organizations have partnered with the U.S. EPA's [WasteWise](#) program as part of their commitment to reduce solid waste. Below are some success stories—drawn from a variety of industry segments—of organizations that have achieved significant cost savings through their waste reduction efforts.



Source: Flickr

**Retail**

**Bass Pro Shops** in Springfield, Missouri implemented numerous innovative waste prevention activities at all of its retail facilities. The company salvaged nearly 170 tons of transport packaging materials through a shipping and receiving waste prevention program, saving more than \$28,000 a year. This program involved the reuse and sale of used wooden pallets. Its cardboard recycling program saves Bass Pro more than \$94,000 and generates more than \$14,000 in donations for a local nonprofit.

**Limited Brands** established new design standards for cardboard boxes used for apparel merchandise, allowing multiple uses from a single box. This effort prevented 87 tons of cardboard from being discarded as waste and saved the company approximately \$215,000 in avoided purchasing costs. In another effort, Limited Brands changed the material used in product return kits from stores and prevented the need for 20,000 pounds of virgin material.

**Manufacturing**

**NEC Electronics**. Rather than throwing away surplus inventory this past year, NEC Electronics, Inc. sold equipment, furniture, and other extras through a public online auction that resulted in \$100,000 of direct revenue. NEC made innovative advances in reducing waste from office products. NEC continued its toner cartridge reuse program, which diverted the disposal of 500 pounds of printer cartridges and allowed NEC to purchase toner at lower prices. The company networked many of its computers so employees can print directly to the copy machine, reducing paper use, toner use, and equipment maintenance, and saving NEC \$20,000.

**Seydel Companies** is a manufacturer of chemicals used in textile processing, including fabric preparation, dyeing, printing, and finishing. Seydel incorporates a glycol distillate, previously sent to other companies for reuse, into a new product sold by the company. Seydel also refined nearly 3,900 tons of fats and oils into usable finished products. In 2005, Seydel's waste reduction measures generated more than \$518,000 in revenue. Seydel adapted its training program to the Internet, saving an estimated 700 pounds of paper, as well as fuel for off-site travel. Additionally, the company increased electronic communication in day-to-day operations for items such as shipping logs, phone lists, reports, and meeting announcements.

**Institutional**

**Los Angeles Unified School District (LAUSD)**. In a sector in which funding is always tight, the district has found numerous ways to save money by reducing waste. Reusing pallets saved LAUSD more than \$77,400 in purchasing costs and \$11,800 in disposal costs. Changing cafeteria food service practices saved \$620,800 in food disposal costs. Grasscycling—the natural recycling of lawn clippings—saved \$395,800 in yard trimmings disposal costs. The district also recycles mixed paper,

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corrugated cardboard, and beverage containers in schools and began an electronics recycling program in 2003.

**Evelyn Hill, Inc.** operates the gift shop and food service at one of the most widely recognized American monuments, the Statue of Liberty National Monument. In 2000, the family-owned concessioner of 150 employees committed to improving solid waste management on Liberty Island, establishing a recycling center on the island and prioritizing waste prevention, recycling, and recycled-content procurement. Evelyn Hill worked extensively with vendors to redesign packaging and lightweight containers and emphasized switching to reusable or recyclable containers. For example, the company negotiated with an ice cream supplier to eliminate the cardboard over-wrap and individual cardboard boxes in ice cream packaging, eliminating more than three tons of cardboard from the waste stream. In total, the company saved more than \$112,000.

#### Service

**Bank of America** in Charlotte, North Carolina has conducted a very successful waste reduction campaign. By educating its employees to incorporate waste prevention activities into their daily tasks, the company saw a reduction in the numbers of forms used, a reduction in copying, and an increase in the development of online tools for employees. The bank also eliminated nearly 23 tons of paper use by subscribing to online magazines and newspapers. Other money-saving waste prevention activities include reducing the use of shrink-wrap, reconditioning and reissuing office equipment, and paper reduction. For example, the company saved 228 tons of paper and \$500,000 by using 15 pound rather than 20 pound paper ATM envelopes.

**Verizon Communications** has realized huge savings through a variety of waste reduction activities. More than three million customers participated in Verizon's online Paperless Billing Service in 2005, which reduced administrative costs by \$3.7 million and saved \$5.4 million in paper processing and printing costs. Verizon switched from a paper-based to an electronic payroll system, saving the company nearly \$100,000 in printing expenses. The company saved tons of paper and more than \$4 million by encouraging employees to obtain training and personnel information through the corporate intranet. The company repaired, reused, or sold more than \$60 million worth of specialized telecommunications equipment salvaged from maintenance and upgrade efforts.

For more information, see the U.S. EPA's [Business Guide for Reducing Solid Waste](#).

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**Busted—Another Natural Gas Safety Myth Exposed**
**Key Points**

- Natural gas heating systems accounted for only 4% of consumer product-related carbon monoxide (CO) poisoning deaths in the US.
- Proper use of these products and CO detectors could greatly reduce consumer product-related CO fatalities.

A number of half-truths, myths, and misconceptions exist in the public domain about the safety of natural gas. For example, in Wikipedia, under the 'Natural Gas' heading it states, "Natural gas heating systems are the *leading cause of carbon monoxide deaths in the United States*, according to the U.S. Consumer Products Safety Commission."

The U.S. Consumer Products Safety Commission is a reliable source. They released a report titled "[Non-Fire Carbon Monoxide Deaths Associated with the Use of Consumer Products](#)" in July, 2008.

The following is what the report actually said:

"During 2005, there were an estimated 195 carbon monoxide (CO) poisoning deaths associated with the use of consumer products under the jurisdiction of the U.S. Consumer Products Safety Commission (CPSC). The estimates presented in this report are based on nearly complete reporting of consumer-related CO poisoning fatalities which occurred in 2005..."

"Of the estimated 195 CO poisoning deaths associated with a consumer product that occurred between January 2005 and December 2005, heating systems were associated with 52 deaths (27% of the total consumer product estimate)...Among the gas heating systems, natural gas heating was associated with an estimated **eight** deaths (15% of heating system-related deaths).." (page 5)

According to this U.S. Consumer Products Safety Commission report, engine-driven tools—such as gasoline powered generators, riding mowers, and garden tractors—were responsible for 109 poisoning deaths (56% of the total CO consumer products poisoning fatalities). Of that total, 96 were generator-associated deaths.

So, Wikipedia is incorrect on two counts. First, natural gas heating is not the leading cause of CO deaths —generators are the leading cause among consumer products. Second, natural gas is not even a major contributor to CO poisoning deaths among heating systems.

It is unfortunate that many of the individuals that perished disregarded safety recommendations or did not have active CO detectors to alert them of the danger. Certainly people must continually be informed of fuel-burning products safe operating practices and more people need to install CO detectors in their homes.

Finally, consumers that have natural gas furnaces should have them checked annually by a qualified expert to ensure they are operating correctly. If you do not have a maintenance agreement, call heating, ventilating, and air conditioning companies in your area for comparative price quotes.

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**Energy Efficiency: How Does Your Business Measure Up?**

Sustainable practices have become recognized as the essence of successful business operations. Through the implementation of new processes and procedures, many facilities have become more efficient, allowing for opportunities to increase production, reduce costs, and save money. While improvement in individual facilities is no small feat, simply measuring the success of the implemented improvements based on increased savings and productivity is not enough. To truly measure success, energy use must be compared with industry standards.



Benchmarking is one of the best ways to gauge whether your facility's operations are energy efficient; and gives insight into facility weaknesses and strengths. Strategic benchmark analysis ensures that investment in unnecessary energy upgrades is avoided, which saves time and can increase your facility's bottom line.

Now essential benchmarking data can be analyzed using the [Commercial Energy Benchmark](#) tool, which gives instant access to industry-specific, average energy use data for similar facilities in the same climate zone. This information, segmented by area of use, provides visibility into potential energy-efficiency problems, and can suggest whether future energy savings are possible and where those improvements should be made. To guarantee the most accurate data, users can choose from 16 industry segments to find the building and operation type most similar to their facility. The user is then given the choice of five climate zones, which gives further insight into the average energy efficiency in that area.

To find out if your facility is operating at optimal energy-efficiency levels, simply click on **Tools You Can Use**, located in the menu bar of every newsletter, and then click on [Commercial Energy Benchmark](#).

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## Employee Awareness Programs Save Energy

### Key Points

- Workplace energy awareness programs are relatively inexpensive to implement and can help cut costs.
- Awareness programs can be implemented as standalone programs or as part of a larger energy efficiency improvement effort.
- There are many documented cases of significant energy savings achieved through successful energy awareness programs.

Employee conservation programs are relatively inexpensive to implement and can be an effective method to help control energy costs. They are often used as a key component of an overall energy management program or in combination with energy efficiency retrofit projects. Just how much an organization can expect to save from an employee awareness program can vary depending on the type of program implemented and the level of commitment. The U.S. EPA estimates that a typical workplace energy awareness program can result in overall savings of 3% on an organization's energy bill. However, there are a number of documented cases where companies have achieved significantly more in energy savings through successful energy awareness programs.



Sharing Ideas. Source: [www.sxc.hu](http://www.sxc.hu)

A *Flex Your Power* report from the California Energy Commission, *Target Business Employees for Energy Conservation in the Workplace*, features several employee awareness programs and discusses their results. Two of these programs, summarized below, highlight how an organization can achieve dramatic energy savings through communicating with employees about the importance of conservation and motivating them to take action.

- *Verizon Communications* developed a company-wide *Energy Champions* program, which asked employees at different locations to take responsibility for motivating co-workers to take conservation actions, such as turning off lights and unused equipment. Energy champions were recognized biannually with a certificate and an Excellence Award. They were also featured in the company newsletter. The Energy Champions program was estimated to save \$1.5 million annually with an average of 9% of total energy consumption at 135 locations between January and September during the first year of the program.
- *Unisys Inc.* dubbed its program *Summer Survivor* based on the theme of the successful reality series *Survivor*. A core program team consisting of 25 representatives from key departments was formed. The program called on all 1,000 employees to take conservation actions. These included cutting hallway lighting in half, reducing office and computer room lighting, and turning off equipment while not in use. The Unisys program cost about \$14,000 for incentives and promotion. During the initial summer period, the program reduced energy usage by 1.8 million kWh, or 22%. Overall energy savings for the year was 3.4 million kWh, or 19%.

The Canadian government has reported on the success of a number of energy awareness programs. A few of these are summarized below.

- *Versacold Group* is a frozen foods company where energy makes up 30% of total operating costs. They began their Maxwell Smart Energy Management Program in 1998. Ideas for energy efficiency improvements were solicited from employees across the organization. Annual conferences between employees and energy managers were held to discuss program successes and failures. Awards were given to the most energy-efficient sites. The overall results of the program were outstanding. Energy consumption was down by 14.3%, a savings of \$1.3 million per year.
- *Canadian Forces Base Halifax*, an East Coast naval base, instituted an ambitious energy awareness program as part of an overall energy performance contract designed to cut energy costs. Employees were encouraged to bring new energy saving ideas to the project manager while conservation habits, such as turning off lights and computers, were encouraged. The base initially invested \$20,000 to start the program, which eventually realized annual savings of \$50,000.
- *Maple Leaf Consumer Foods* created an energy awareness program called *Energy Champions*. The program action plan consisted of the following measures:
  - Energy audit to create a checklist

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- Energy workshop to increase knowledge
- Energy Day to promote change in the organization
- Prize-winning campaign to provide employees with incentives

In 2002, the first year of the program, the company saved about \$4 million, \$3.2 million of which can be attributed to the employee awareness program. This was an energy savings of about 5%.

For more information about how to develop an energy awareness program and motivate your employees to conserve energy, see [Get Energy Savings Working For You](#).

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**Kitchen Ventilation: Energy Efficiency on Demand**
**Key Points**

- Kitchen ventilation systems account for up to 75% of the total HVAC load in a typical food service facility.
- Energy is wasted when kitchen ventilation units operate at full speed during idle cooking times.
- Demand ventilation systems save energy by varying ventilation fan speeds according to need.

Comfort and air quality cannot be overlooked in today's commercial kitchens. Just as customers and guests want to feel comfortable, kitchen employees need a healthy working environment in order to be productive. Kitchen ventilation plays a critical role in indoor air quality, fire prevention, and employee comfort. Kitchen ventilation systems however, use a significant amount of energy. Studies have shown that ventilation systems account for up to 75% of the total heating, ventilation, and air-conditioning (HVAC) load in commercial food service facilities—and up to 15% of total energy costs. Kitchen ventilation therefore, offers food service facilities a significant energy- and cost-saving opportunity.



Source: www.energystar.gov

**The Problem with Kitchen Ventilation**

The purpose of a commercial kitchen ventilation system is to remove a variety of effluents emitted from kitchen equipment. These effluents include the following: heat, steam, smoke, odors, grease, and carbon monoxide. A kitchen exhaust system is made up of three basic elements. A hood captures and filters the heated air as it rises. Duct work transfers heat and contaminants to the fans. Exhaust fans remove the heat and contaminated air out of the building. Make-up air is necessary to replace the exhausted air. This is usually provided with an independent unit or in combination with the building HVAC system.

A big issue in many food service facilities is that the kitchen often has significant amounts of idle cooking time when equipment is not fully utilized. A typical exhaust system however, is designed to operate at a constant rate. During slow periods, it will continue to extract air at a high speed, requiring large amounts of make-up air. This can result in a significant amount of wasted energy. Not only is the ventilation unit putting in unnecessary time, but the HVAC system as a whole has to work harder to condition the extra make-up air.

In terms of ventilation, many commercial kitchens are still operating in the dark ages. While many restaurants and lodging facilities have installed sophisticated controls for lighting and space conditioning, they are still wasting energy with the same decades-old ventilation technology. Newer technologies, such as demand-controlled ventilation can help commercial kitchens save energy while still maintaining indoor air quality and a safe and healthy working environment.

**Demand-Controlled Kitchen Ventilation**

Demand ventilation systems control the speed of kitchen ventilation fans based on the need for exhaust created by the cooking equipment. By reducing ventilation fan speed—and the need for make-up air—during idle times, food service facilities can realize a noticeable reduction in their overall HVAC load.

Demand ventilation systems use variable volume controls to regulate fan speed. They are energy efficient because they control exhaust and make-up air fan speeds according to usage. The fan speeds are controlled by sensors installed within the ventilation hood or kitchen area—a carbon monoxide sensor, optical sensor, and temperature sensor. Upon detecting excessive heat or other effluents, control signals are sent to a microprocessor to operate the fans at full speed until all contaminants or high-heat conditions are removed. These controls operate the exhaust fans and make-up air unit automatically according to fluctuating usage.

In one case study, a demand ventilation control package was installed in the kitchen of the InterContinental Mark Hopkins Hotel in San Francisco, California. The speed of the exhaust fan and make-up air fans is modulated by variable frequency drives (VFDs). The VFDs receive signals from an infrared beam and a temperature sensor. The annual savings for the hotel was over \$19,000. With an installed cost of \$15,000, the payback was less than one year (Fisher 2007).

**Additional Energy-Saving Strategies**

Installing variable speed controls represents one method of reducing energy consumption in kitchen ventilation systems. Other energy-saving operational practices and design ideas include the following:

- Ensure that the ventilation system is properly balanced. In other words, make sure that the appropriate

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amount of make-up air is being introduced to compensate for the air being taken out by exhaust hood. An insufficient or excessive amount of make-up air cannot only make the ventilation system work ineffectively, but it can also lead to other problems, such as making doors in the building difficult to open. The best way to introduce make-up air in a kitchen is to integrate the kitchen ventilation system with the building HVAC system, using conditioned air from adjacent serving areas or dining rooms.

- Minimize make-up air velocity near the canopy or hood. It should be at no more than 75 feet per minute.
- Group cooking appliances based on how much of an effluent they produce. Specify different ventilation rates accordingly. For heavy effluent producers, such as charbroilers, position the appliance in the center of a hood section, rather than at the end.
- Be sure that access panels are properly installed and sealed, and that all sections of ductwork are accessible for cleaning.

#### References

Fisher, Don. 2007. Ventilating the kitchen - fiction, fact, and future! *Hotel F&B*, (March/April), <http://www.hotelfandb.com> (accessed May 20, 2008)

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**Gas Meters—One Size Does Not Fit All**
**Key Points**

- No one gas meter fits every application.
- The type of meter chosen depends on a number of conditions, and should not be sized based only on pipe diameter.
- The flow rate of natural gas changes with pressure and temperature variations, so temperature compensation and/or pressure compensation may be required.

The means to measure natural gas usage is evolving, with some new designs now available for improved accuracy at a reasonable cost. Sub-metering and automatic remote metering are becoming more commonplace, as commercial and industrial customers are discovering the importance of tracking energy use at industrial furnaces, ovens, oxidizers, or process heaters. Descriptions of the meter types as well as advantages and disadvantages are provided below, along with a few relevant definitions for reference:

- **SCFH**—Standard Cubic Feet per Hour, gas flow rate at standard temperature (60°F, 15.6°C) and pressure (14.73 psia)
- **SCFM**—Standard Cubic Feet per Minute, gas flow rate at standard temperature (60°F, 15.6°C) and pressure (14.73 psia)
- **ACFM**—Actual Cubic Feet per Minute, gas flow rate at the actual temperature and pressure
- **Turndown ratio**—The range over which a meter performs to prescribed accuracy levels, it may be less than 5:1 up to more than 100:1 for the various meter designs described below
- **Temperature compensation**—As the volume of gas varies with temperature, the meter requires an adjustment factor to more accurately measure the thermal value of the gas supplied
- **Pressure compensation**—As the volume of gas varies with pressure, the meter requires an adjustment factor to more accurately measure the thermal value of the gas supplied

**Gas Flow Meter Types**

The table below provides a comparison of the various gas meter types:

Attribute	Positive Displacement	Differential-Pressure	Ultrasonic	Thermal Mass Flow	Coriolis	Turbine
<b>Accuracy</b>	1%-2% full scale	1.5%-2% full scale	1%-2% full scale	1%-2% full scale	0.05%-0.15% of reading	0.25%-1% of reading
<b>Repeatability</b>	0.5% full scale	1% full scale	0.5% full scale	0.2%-0.5% full scale	0.05%-0.10% of reading	0.1% of reading
<b>Typical SCFH Range</b>	100-23,000	100-1,000	100-2,000	200-75,000	1,000-50,000	9,000-230,000
<b>Turndown Ratio</b>	50:1-100:1	5:1-20:1	50:1-100:1	10:1-20:1	50:1-100:1	15:1-25:1
<b>Price</b>	\$100-\$8,000	\$600-\$1,500	\$500-\$3,500	\$1,000-\$5,000	\$2,500-\$5,000	\$2,000-\$30,000
<b>Application</b>	Residential, Commercial	Commercial, Industrial	Residential, Commercial	Commercial, Industrial	Commercial, Industrial	Industrial, Utility

**Positive Displacement Meter**—Contains a compartment or impeller which is directly displaced by the incoming gas flow; diaphragm and rotary meters are the most common types as described below:

- **Diaphragm Meter**—The gas is trapped into compartments of known volume within the meter and then emptied. The flow rate is determined by the amount of times the compartment fills and


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empties. Diaphragm meters are primarily used in low flow applications such as for residential and small business, and must be temperature compensated for colder climates. Because of its moving parts and seals, this meter design is subject to wear and has a rated life of perhaps 30 years. Diaphragm meters have an accuracy of  $\pm 1.0\%$  for turndown ratios of 100:1. They can be used in higher turndown ratio applications, and are typically the lowest cost gas metering option. Diaphragm meters are most commonly found in low flow applications up to 500 scfh, but can be designed for use up to 10,000 scfh and higher.



- **Rotary Meter**—Two impellers are encased within a rigid measuring chamber, with inlet and outlet connections on opposite sides. Precision machined timing gears keep the impellers in correct relative position as the incoming gas supply forces the impeller to rotate at a speed that can be correlated to the actual gas flow. Rotary meters can handle higher gas volumes than the diaphragm meter, with capacities from 800 scfh up to 56,000 scfh. Accuracies are typically in the 1% range, but can be more precise depending on design. Turndown ratios from 50:1 to over 100:1 are achievable.

**Differential Pressure Meter**—A pressure drop is forced by a constriction in the pipe, such as an orifice plate. The flow rate is proportional to the square root of the pressure drop across this obstruction and is calculated by using Bernoulli's equations. The orifice plate typically has one hole in the center of the plate, though there are multiple-hole designs to improve accuracy by lowering the pressure drop more uniformly across a larger area. Differential pressure meters such as orifice plate designs are lower cost and very common in industry. Plates need to be changed out with any wear around the hole(s) edges, because this changes the pressure drop and affects meter accuracy. Generally, meter accuracy is in the range of  $\pm 1.5\%$  at a 5:1 turndown ratio.

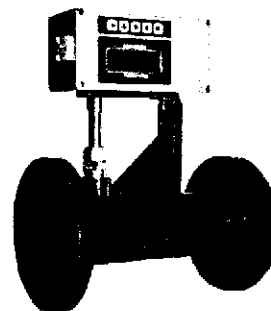


Ultrasonic Meter  
Courtesy of Sensus

**Ultrasonic Meter**—Uses sound waves to detect the flow of gas by measuring the difference in response time for an ultrasonic signal to travel with the gas flow compared to the time it takes to travel against the gas flow. This "time of flight" measurement determines the velocity of the gas flowing in a pipe, and the volume is then incorporated into the calculation by computing the pipe's cross-sectional area. There are no moving parts or wear surfaces to affect the meter accuracy, which is typically  $\pm 2.0\%$ , but as low as  $\pm 1.0\%$  for some designs.

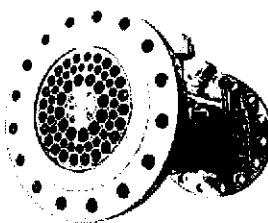
**Thermal Mass Flow Meter**—Measures the mass flow rate directly, and is not affected by density, pressure, and viscosity variations. The thermal mass flow design uses two platinum sensor elements that are inserted into the gas flow. One sensor measures the gas temperature, and the other sensor is self-heated to measure gas flow. As gas flows by the self-heated sensor, the gas molecules carry heat away from the surface, and the sensor cools down. A higher gas flow carries away more heat. An internal circuit heats this sensor back up to maintain a constant temperature differential with the reference sensor. The amount of energy supplied by this internal circuit is directly proportional to the gas mass flow rate. There are variations to this design, including the use of a bypass tube and temperature coils to establish a temperature differential, but the principle is essentially the same. Capacities range from 200 to 75,000 scfh, with accuracies of  $\pm 2\%$  at a 20:1 turndown ratio.

**Thermal Mass Flow Meter**—Measures the mass flow rate directly, and is not affected by density, pressure, and viscosity variations. The thermal mass flow design uses two platinum sensor elements that are inserted into the gas flow. One sensor measures the gas temperature, and the other sensor is



Courtesy of Maxon Corporation, a  
Honeywell Company

**Coriolis Meter**—Very accurate for medium to higher speed gas flows in pipes of 2-inch diameter and less. The Coriolis effect implies a relationship between the phase difference in the vibration of the upstream and downstream pipe elbows and the mass flow rate of the gas contained by the pipe. It is a higher cost, highly accurate meter that is primarily used in industrial applications.



Courtesy of Ester American Meter

**Turbine Meter**—Based on the fact that gas flow spins the turbine vanes at a speed that is proportional to the gas flow, the turbine meter can handle very high usage exceeding 50,000 scfh. It can be found in industrial plants with high gas consumption, or at city gate facilities on incoming gas distribution lines. Turbine meters are accurate to within  $\pm 0.5\%$  at turndown ratios upwards of 50:1.

All flow meters require an initial calibration, which can be accomplished by qualified technicians or your meter supplier. Flow meters with no moving parts usually will require less attention than units with moving parts. It is important to size the meter based on the application, and not to base it only on line size (pipe diameter). Also, many situations will require temperature compensation and/or pressure compensation, which are necessary where the temperature and pressure drift from the standard

conditions.

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**Liquefied Natural Gas: Coming to a Burner Tip Near You**
**Key Points**

- Liquefied natural gas (LNG) is natural gas that is condensed into liquid and then stored or imported for use in the U.S. gas supply.
- LNG imports are expected to play an increasingly important role in the future natural gas industry.
- Concerns about safety and the impact of LNG on natural gas equipment are issues that the industry must address going forward.

Liquefied natural gas (LNG) is natural gas that is condensed into liquid and then stored or imported into the United States, where it is regasified and injected into the gas supply. While LNG makes up only a small percentage of natural gas consumption today, many experts believe that changing supply and demand dynamics will make LNG a significant part of the natural gas market in the near future.



Source: www.doe.gov

**The LNG Market**

While a domestic LNG production market for peak shaving has existed for years, the primary growth trend is for LNG imports from countries such as Trinidad and Egypt. Eight LNG import terminals are currently operating in the United States. This is double the amount from just a few years ago and—according to the Federal Energy Regulatory Commission (FERC)—40 more projects are currently approved for construction or are in the planning stages.

The LNG import market actually began in the 1970s, but it remained flat throughout the 1980s and 1990s due to low gas prices and abundant supplies. Beginning in 2000, LNG imports began rising significantly as a result of increased demand for natural gas and a tightening of domestic supplies. In 2007, imports reached a record high of 770 billion cubic feet. Imports declined by more than 50% in 2008 due to production delays and increased demand for LNG in Europe and Asia. The U.S. Energy Information Administration and other industry experts expect the U.S. market for LNG to rebound and the long-term growth trend to continue.

While the development of large LNG import terminals gains the most attention, domestic LNG production and storage facilities have existed in the United States since the 1940s. Currently, there are more than 100 such facilities in the U.S. Historically, the primary end use for LNG has been to help local utilities meet peak demand needs, primarily during cold weather. In recent years niche markets for LNG have arisen in supplying vehicle fuel or as a fuel source for isolated commercial and industrial facilities. LNG is becoming more important as an alternative to traditional fuels, such as diesel and gasoline. Organizations and municipalities that manage vehicle fleets are setting up LNG fueling stations that provide low-cost and cleaner-burning natural gas. One example is the LNG refueling station for school buses at the Southwest Education Support Center in Caruthers, California.

**The LNG Process**

LNG production involves a complex process of cooling and condensing into liquid form, storage and transportation, and regasification.

LNG results when natural gas is cooled in large refrigeration systems to around -260°F and the gas is condensed into liquid form. The process shrinks the liquid to a volume of about 600 times smaller than the gaseous state. Liquefaction typically takes place at large plants located near import terminals. On a smaller scale, gas is extracted from pipelines and liquefied and stored at peak shaving plants. Key equipment used in the liquefaction process includes compressors to circulate refrigerant, compressor drivers, and heat exchangers to cool and liquefy the natural gas.

LNG is transported and stored in specially designed double-hulled tankers to prevent leakage or rupture. The double hull provides increased structural safety, and the insulation allows the ships to act like thermos bottles to keep the LNG cold. The LNG is stored in a special containment system within the inner hull at atmospheric pressure. Large LNG tankers hold up to approximately 138,000 cubic meters of LNG in liquid form, or about 3.0 billion cubic feet.

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To convert LNG back into its original gaseous state, it is fed into a regasification plant. Regasification is typically achieved through reheating the LNG with at least one heat exchanger. Two methods are commonly used. In one technique, a small amount of the LNG is burned in a submerged combustion vaporizer, which produces the heat needed to gasify the remaining LNG. The other common method involves utilizing open rack vaporizers that gasify the LNG with heat from ambient water, such as seawater or river water.



Source: [www.epa.gov](http://www.epa.gov)

### Safety Concerns

Protesters of proposed LNG projects in New England and California have expressed concern over the explosive potential of facilities and tankers and their potential use as a tool for terrorists. Opponents point to the devastating explosion at a liquefaction plant in Algeria that killed more than 24 people. However, as a liquid, LNG cannot burn or explode. In a gaseous state, LNG vapor can only burn if it exposed to a specific proportion of air. According to the U.S. Department of Energy, the LNG industry has a proven safety record with 40 years of shipping LNG over the Atlantic, Pacific, and Indian oceans, with no major incidences involving LNG ships or their cargo. The LNG facilities located on land are subject to stringent safety rules and environmental standards enforced by FERC and the U.S. Environmental Protection Agency.

### Impact on Natural Gas Equipment and Appliances

Gas-fired equipment and appliances were designed for domestic natural gas and there is some concern that they are not compatible with the enhanced combustibility of imported LNG, which has higher quality and fewer impurities. Some industry experts claim that interchanging LNG for domestic gas could increase carbon monoxide, nitrogen oxide, and soot. It also could lead to premature failure of heat exchangers and temperature-sensitive components. Energy experts, such as the American Gas Association, believe that interchangeability will not be a major issue and that gas-fueled equipment will not have to be altered in any significant way to accommodate LNG. FERC and others are working on proposals to standardize LNG quality that account for foreign sources. In addition, a number of techniques currently exist for blending gas (such as with nitrogen) to lower the combustibility of LNG.

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**The Green Space: A Job of a Different Collar**

We have spent decades defining the type of work we do by the color of our collars, but our choices have primarily been limited to two—blue and white. Traditionally, occupations in the manufacturing sector have been identified as blue, while occupations in the corporate world—administrative, managerial, or executive office positions—have been defined as white.


**Defining Green Collar Jobs**

During recent political campaigns, we were told the future holds millions of green-collar jobs. Exactly what a green collar job is, and how many will materialize is unclear. Is green collar the new blue collar? Can office workers change the color of their collars? Do green jobs have the staying power to make a difference in our economy? Although the prospect of millions of new, environmentally friendly jobs is inspiring, ironing out the details may be difficult.

University professor Patrick Heffernan is credited with coining the phrase green collar in his study *Jobs for the Environment: The Coming Green Collar Revolution*, which he presented at a Congressional Hearing in 1976. Since then, however, no one has been able to clearly identify the term. Definitions range from that proposed by the Apollo Alliance "A green-collar job is in essence a blue-collar job that has been upgraded to address the environmental challenges of our country," to the broader description offered by the United Nations Environment Program (UNEP):

"We define green jobs as work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high-efficiency strategies; de-carbonize the economy; and minimize or altogether avoid generation of all forms of waste and pollution."

A chemistry technician working at an ethanol plant may consider his or her job green collar, but what about the metal fabricator who now builds storage tanks for the finished ethanol product, but built petroleum storage tanks last year? Or, the gas station attendant who spends half of his day pumping gasoline, and the other half pumping E85 ethanol?



Source: www.sxc.hu

**Green Collar Jobs Are the Wave of the Future**

The exact number of future green-collar jobs is also up for debate. President Obama, for example, has promised the creation of 5 million new green-collar jobs over the next 10 years. A widely quoted new report from the American Solar Energy Society, *Green Collar Jobs in the U.S. and Colorado, Jan. 2009* predicts that nearly one in four U.S. jobs will be in the renewable energy and energy-efficiency sector—a total of 37 million jobs—by 2030.

If we become caught up in the arguments over numbers, we may lose sight of the larger change that is taking place. Admittedly, it is difficult to view an autoworker that has gone from building pickup trucks to plug-in hybrids as having a new job. What is important is the fact that millions of workers are beginning to repackage their talents and skill sets in a green context. We are not all going to find positions at the solar panel factory, but as we—and the companies we work for—realize the importance of being environmentally responsible, green collar jobs may be derived from making environmentally conscious work decisions.

**Small Steps toward Change**

Cleaning our facilities with environmentally friendly products, selecting locally grown produce for our restaurants, and making sure the toner cartridges from our office printers are recycled, are easy ways for companies to become more green. Moreover, as emerging state and federal regulations begin requiring us to further improve our energy conservation practices, and use more energy coming from renewable sources, new jobs will be created and existing jobs will be transformed. Whether we grow corn for ethanol production or install solar panels, all of us—in varying degrees—will be working at green-collar jobs, no matter how small the steps taken to get us there.

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**Combined Heat and Power Success Stories**
**Key Points**

- Combined heat and power is a method of generating power and thermal energy from a single source.
- A variety of different facilities have successfully achieved significant energy savings using gas-fired CHP systems.
- CHP may not be applicable to all situations, and careful consideration is required before installing a system.

Combined heat and power (CHP)—also known as cogeneration—is an efficient, clean, and reliable approach to generating power and thermal energy from a single fuel source. CHP utilizes a variety of technologies and has broad applicability across commercial, industrial, and institutional facilities. Natural gas-fired technologies used in CHP systems include reciprocating engines, combustion turbines, fuel cells, and microturbines. This article highlights four successful CHP installations that demonstrate these technologies in action.


 Source: [www.doe.gov](http://www.doe.gov)
**Office Complex**

The Verizon Telecommunications central office in Garden City, New Jersey is a 292,000 square foot facility that houses 900 employees. The facility uses seven fuel cells paralleled with the grid, three reciprocating engines, two absorption chillers, and a heat recovery steam generator (HRSG) to provide power, cooling, and heating to the facility. The fuel cells and reciprocating engines provide power to the facility at different times and outputs, depending on the needs of the facility and time of year—such as during the peak demand summer season. The system recovers waste heat from the fuel cells to cool the central office in summertime using the absorption chillers. The CHP system has been operational since June 2005. With an estimated annual energy and operational savings of \$750,000, the expected payback is less than 10 years. From an environmental perspective, the system offsets more than 11 million tons of carbon dioxide each year. View the [full case study](#).

**Industrial Laundry Facility**

Arrow Linen is an industrial laundry facility located near Prospect Park in Brooklyn, New York. The facility uses large quantities of hot water and electricity to clean uniforms, table linens, and other items for restaurant and institutional customers. Two 150-kilowatt (kW) natural gas-fueled engines were installed to produce electric power and preheat hot water consumed in the facility. A hot water loop recovers heat from the engine block as well as an exhaust-to-water heat exchanger. The recovered heat is provided for domestic hot water loads as well as to preheat makeup water for the boiler feedwater system. The system achieves over 80% efficiency and has resulted in monthly energy savings of an estimated \$10,000.

**Hotel**

Starwood Hotels and Resorts Worldwide Inc. began operating a 250-kW fuel cell CHP system at the Sheraton New York Hotel and Towers—a 1,750-room facility and the brand's flagship property—in June 2005. The CHP system—fueled by natural gas and located on a fourth-floor rooftop—provides about 10% of the hotel's electricity and hot water and is designed to supply backup electricity for a portion of the hotel. Annual energy savings from the system are an estimated \$70,000.

**Ethanol Plant**

Adkins Energy LLC in Lena, Illinois is an ethanol plant with a capacity of 43 million gallons per year. Approximately 99% of the electrical energy requirements of the ethanol plant are supplied by a 5 MW combustion turbine based combined heat and power (CHP) system. The CHP system incorporates a heat recovery steam generator (HRSG) that recycles waste heat from the turbine that provides more than 30% of the thermal requirements of the plants production process. The system has been online since 2002 and cost \$3 million dollars to install. At an annual savings of more than \$900,000, the system achieved a simple payback in a little more than three years.

**Learn More**

The benefits of CHP sound great—a reliable on-site power source, combined with heat recovery for space or process heating. The truth is, while CHP is useful in a variety of settings, it may not be cost-effective in certain situations. CHP can often come with a hefty upfront price tag. Any evaluation of a cogeneration system should

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involve careful consideration of the facility's energy needs, the type of systems involved, the installation and operational costs, and the potential return on investment. For more information, see [Cogeneration: Is It Right for My Facility?](#)

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## Efficiency Upgrades: A Five-Step Process

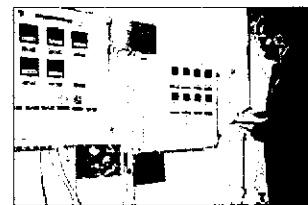
## Key Points

- Energy-efficiency upgrades can save organizations up to 30% on energy costs.
- Significant upfront investments may be necessary in order to achieve long-term energy savings.
- Data collection and analysis, careful planning, and management are necessary to maximize results.

Innovative energy conservation and efficiency projects can help facilities save energy and money, improve productivity, and increase business competitiveness. Energy retrofits that replace older systems with newer, more efficient technologies can save organizations up to 30% on energy costs. Efficiency upgrades can require significant upfront investment in time and money, however. A five-step process involving data collection and analysis, planning, smart investments, and management—can help to ensure maximum energy savings and a faster return on your investment.

## 1. Gather Information

You cannot fix it, if it is not broken. This old pearl of wisdom goes for energy-efficiency projects as well. In order to improve energy efficiency, you must first find out where you are wasting energy. This is why energy benchmarking is such an important first step. Energy benchmarking is the collection and analysis of data that provides facilities with a context for comparing energy efficiencies. Armed with this information, facility managers can spot inefficiencies, identify energy-saving opportunities, and monitor performance improvements over time.



Source: www.doe.gov

To begin, gather utility bills for at least one year for natural gas, electric, and any other fuels that you use. Contact your utility account manager for any information that is not readily available. For complex facilities, consider installing submeters to analyze individual equipment or processes. Next turn this information into data that can be used for comparison. Important metrics include British thermal units (Btu) and kilowatt-hours (kWh) per square foot. It is also important to take into account factors including weather, type of facility, number of occupants, operating hours, and so forth. Next use the [Commercial](#) or [Industrial](#) Energy Benchmark tool to compare your energy use with similar facilities in your climate zone.

## 2. Investigate

An *energy audit* is a detailed analysis of your entire facility's energy use. It can help to spot specific energy-saving opportunities. An audit should cover all building systems and equipment, including lighting, HVAC, building envelope, and process equipment. An energy audit can be conducted by an outside consultant, or you can perform your own internal audit. Many facilities have found that conducting their own energy audits has resulted in significant benefits. If, after evaluating the results of your audit, you determine that a more detailed analysis is necessary, you can then contact a professional energy management consultant. The information from your self-assessment will provide important background information for the more in-depth examination. For more information, see [Conducting An Energy Investigation of Your Facility](#).

## 3. Get Organized

An energy management program is designed as a systematic way to establish priorities, make key decisions, and ensure that efficiency upgrades are in line with the organization's overall strategic objectives. The following are some key steps in implementing a program:

- Appoint an energy team from a variety of departments for initial planning and implementation.
- Name an energy manager responsible for overseeing program development and management.
- Articulate a policy statement that defines the overall goals and objectives of the program.
- Develop an action plan to implement recommended energy-saving measures, measure results, and communicate program successes.



Source: www.sxc.hu

Energy management is an ongoing process of continuous improvement. For more details about implementing and developing a program, see [Best Practices in Energy Management](#).

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Find out how to [lower your natural gas use](#) with quick and easy energy-saving tips.

#### 4. Make Investments

You have gathered all of the relevant data and developed an overall plan. Now is the time to make the hard decisions about where to spend your dollars to save the most energy and realize the fastest return on your investment. So how do you make the tough choices? Your energy audit and energy management program can provide some guidance, but efficiency upgrades can be costly and you can use all of the help you can get in making the right decisions. The [Commercial](#) and [Industrial](#) Efficiency Recommendations provide industry-specific advice on how your company can save energy and reduce costs. The [ENERGY STAR®](#) Web site is another great tool. A joint program of the U.S. Environmental Protection Agency and Department of Energy, ENERGY STAR provides energy-efficiency advice, profiles of companies that have successfully achieved significant energy savings, and a database of certified high-efficiency products and equipment.

#### 5. Measure Results

Measurement and verification is critical to the success of energy-efficiency upgrades and an overall energy management program. This sort of data is necessary to calculate return on investment, communicate results to upper management, and provide a springboard for continuous improvement efforts in energy efficiency. For more information, see [For the Record: Energy Accounting Helps Manage Costs](#).

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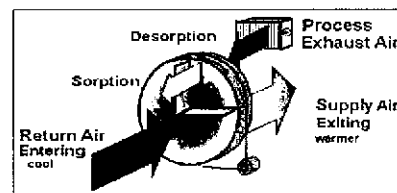
**Did You Know? Heat Wheels Turn Exhaust Air into Energy Savings**
**Key Points**

- Heat recovery from exhaust air is a great opportunity to reduce energy costs in commercial and industrial facilities.
- Heat wheels are rotating discs that transfer heat and moisture from one air stream to another.
- Heat wheels can recover heat at efficiencies of up to 85%.

Heat recovery is one of the most effective ways to optimize energy efficiency during building operations. Exhaust air from processes and heating and cooling systems is a primary source of useful waste heat. Transferring the energy from the exhaust air to the incoming outdoor air reduces the energy required to condition the incoming air. Several heat recovery technologies are available, including recuperators, heat pipes, plate heat exchangers, and heat wheels. Heat wheels have been gaining in popularity in recent years because they are highly efficient at recovering heat.

**How Heat Wheels Work**

Heat wheels—as the name implies—are rotating heat exchangers that transfer air between two air streams with different temperatures. A heat wheel is a revolving disc with an air-permeable material. Aluminum wire mesh is the most commonly used material because of its high heat-transfer capabilities. Ceramics, plastics, and paper are also used. Many heat wheels are coated with a desiccant material that transfers moisture as well as heat through the air stream. In the hot, humid summer, this can help to control humidity levels and reduce cooling loads. In the cold, dry winter, it can help to maintain humidity levels without increasing energy costs.



Heat wheels are located inside the duct system. Part of the wheel is mounted in the exhaust duct, while the remainder is in the supply air duct. A small motor and belt drive rotates the wheel. Typical rotating speeds are in the range of 20 to 30 revolutions per minute (RPM). When air passes through the material, heat energy and moisture are transferred to the material. As the wheel rotates, the heat and moisture are transferred to the opposing air stream.

**Applications for Heat Wheels**

Heat wheels have been used for years in power plants and industrial facilities to recover heat from flue gases in boilers and process heating. In recent years, they have been used with more frequency for recovering heat and moisture in building heating and cooling applications. Where lower relative humidity is an advantage for comfort or process reasons, a heat wheel with desiccant coating can be a great help. Facilities with processes that require a large percentage of outdoor air and have the exhaust air in close proximity to the intake can save energy dollars by using heat wheels to preheat or pre-cool incoming air. Facilities with "sick building syndrome" or other indoor air quality issues can utilize heat wheels to condition incoming outside air.

**Advantages of Heat Wheels**

Heat wheels are highly effective at recovering heat and, given the right application, can recover moisture as well. They are available off-the-shelf and typically have flexible installation design options. Generally, heat wheels can recover heat at efficiencies of up to 85%. They offer a number of other advantages as well:

- Relatively low cost.
- Compact size compared to other heat recovery technologies.
- Low air pressure drop.
- Freeze protection is not an issue.
- Heat exchanger cores are easy to clean.

Heat wheels are not perfect. They have some disadvantages. The two air streams must be adjacent and relatively clean—and possibly filtered. There is a possibility of cross-contamination (mixing) between air stream flows. Moving parts may require extensive maintenance. When properly applied however, heat wheels are cost effective and can reduce energy consumption and environmental impact.


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### Case Study

Daimler Chrysler installed heat wheels for ventilation of its workshops and for some production processes at its Rastatt plant in Germany. They claimed a savings of 30% to 50% of the heating energy, totaling 45,000 megawatt-hours per year. (U.S. Environmental Protection Agency, 2003)

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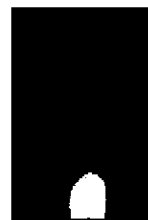
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**Gas Versus Electric—Natural Gas Conserves Energy and Lowers Emissions**
**Key Points**

- A growing amount of natural gas is being used for the generation of electricity.
- The direct use of natural gas to fuel appliances and equipment is a more efficient use of this resource.
- Cleaner burning natural gas produces less than half the amount of greenhouse gas emissions than electricity produces.

Natural gas is used by more than 69 million homes and business in the United States, according to the American Gas Association. Natural gas has long been known as a cost-effective and reliable source of energy. More and more Americans are becoming aware however, that clean burning natural gas is also good for the environment. Compared to electricity produced by burning natural gas, coal, or oil—the direct use of natural gas to power efficient appliances and equipment is much more energy efficient and produces far fewer emissions.



Source: www.doe.gov

**Natural Gas and Electric Power Generation**

The electric power industry has come to rely more and more on natural gas as a source for generation, according to statistics from the U.S. Energy Information Administration (EIA). A decade ago, an estimated 14% of electricity was generated using natural gas. Today, that total is more than 21%. Of the total planned new electric generation capacity through 2012, more than half will be fueled by natural gas.

The large volume of natural gas used to generate electricity puts price pressure on natural gas. Because the direct use of natural gas is much more energy efficient than using natural gas to produce electricity, one way that consumers can help to lower natural gas prices would be to use less electricity. Switching to natural gas fueled appliances and equipment can help to lower electricity demand and, therefore, relax these price pressures and lower costs to consumers.

**The Direct Use of Natural Gas and Energy Conservation**

Fueling appliances and equipment directly with natural gas is a much more efficient use of this resource than using it to produce electricity and then transporting it across the grid to power those same appliances and machines.

When deciding between natural gas and electric appliances and equipment, consumers can often be confused by efficiency ratings. For example, a typical high efficiency electric water heater may have an efficiency rating of 90%, while a high efficiency gas unit may be rated at 65%. Sounds like the electric unit is a much more efficient use of resources, right? Well, not when you consider the *total fuel cycle*, which is the overall efficiency in delivering energy from its source to the ultimate consumer. In this case, natural gas is the clear winner—90% versus 31% for electricity—according to analysis of energy flow data from the EIA.

The following tables helps to illustrate this point by considering the previous example of the high efficiency water heaters. The electric water heater has a 90% efficiency rating, while the gas unit has a 65% rating. When you consider total fuel cycle, however, a different story emerges. The electric water heater has a total fuel cycle efficiency of 28%, while the gas unit comes in at 58%. In other words, if you consider the amount of energy generated to power the electric water heater, only 28% of that is actually used by the water heater. The natural gas water heater, on the other hand, uses 58% of its "fuel cycle" energy.

**Overall Efficiency of Electric Water Heater**

Electric water heater efficiency	90%
Electric generation, transportation, and distribution efficiency	31%
Life cycle efficiency	28%

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A weekly updated look at current energy prices, recent trends, projections, and market information. [read more](#)


**Energy Saving TIPS**

Natural gas appliances can not only help sell a home, but also have a low carbon footprint.

Find out how to lower your natural gas use with quick and easy energy-saving tips.

Overall Efficiency of Natural Gas Water Heater	
Natural gas water heater efficiency	65%
Gas wellhead to consumer efficiency	90%
<b>Life cycle efficiency</b>	<b>58%</b>

The [American Clean Energy and Security Act of 2009](#) includes a proposal to evaluate appliances and equipment in this way. Fuel sources would be evaluated from the end use all the way back to the generation site, which means the power generation plants for electricity and the production fields for natural gas, propane, fuel oil, and other fossil fuels. This would help consumers make more informed decisions about the efficiency and environmental impact of the equipment and appliances that they purchase.

#### The Direct Use of Natural Gas and the Environment

In addition to helping to conserve energy, the direct use of natural gas can help the environment by lowering greenhouse gas emissions caused by electric power generation. Electric power generation produces carbon dioxide emissions (CO<sub>2</sub>) at more than three times the rate of natural gas consumption. An average of 1.34 lbs of CO<sub>2</sub> is produced per kWh of electricity generated, according to EIA data. An equivalent amount of natural gas (3412 Btu) produces only about 0.4 lbs of CO<sub>2</sub> emissions. Overall, electricity generation and consumption produces more than twice the amount of greenhouse gas emissions than natural gas, according to the EIA. Clearly, the direct use of natural gas can have important environmental benefits.

#### Natural Gas: The Clean and Efficient Energy Choice

Choosing natural gas to fuel your appliances and equipment can have important benefits in terms of cost and efficiency. Lowering electric demand helps to reduce consumer energy costs for both gas and electric. The superior efficiency and emissions profile of natural gas production, transmission, and distribution—compared to electric power generation—helps to conserve precious natural resources while improving the health of the environment.

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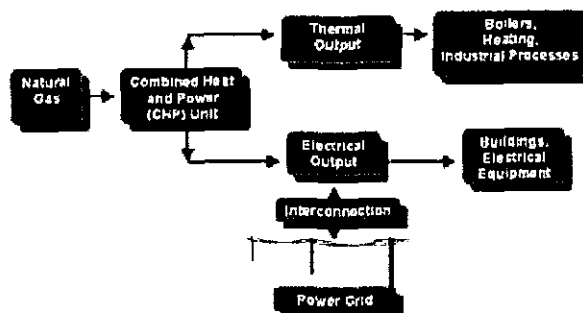
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**Combined Heat and Power—Incentives Now Available in Arizona**
**Program Description**

Southwest Gas has a program designed for commercial and industrial customers in Arizona that encourages the installation of high efficiency combined heat and power (CHP) systems.

Formerly known as cogeneration, CHP systems will normally produce localized, on-site power generation. They can vary in size from several kilowatts (kW) to several megawatts (MW) of produced electric power. There are many benefits including greater efficiency, with related energy savings and lower energy costs.

CHP describes any system that simultaneously or sequentially generates electric or mechanical energy and utilizes the thermal energy that is normally wasted. Most CHP systems are configured to generate electricity or mechanical power, recapture the waste heat and use that heat for space heating, water heating, industrial steam loads, air conditioning, humidity control, water cooling, product drying or any other thermal need. Alternately, CHP may use excess heat from industrial processes and turn it into electricity.



CHP technologies will be required to achieve a total fuel efficiency of 60% or higher in order to qualify for funding. This efficiency must be shown during standard operations as defined by the customer. Standard operations will vary depending upon the type of facility where CHP is being utilized.

**Incentives**

- \$500/kW for CHP systems with minimum fuel efficiency of 70%, up to a maximum of 50% of the installed cost of any project.
- \$450/kW for CHP systems with minimum fuel efficiency of 65%, up to a maximum of 50% of the installed cost of any project.
- \$400/kW for CHP systems with minimum fuel efficiency of 60%, up to a maximum of 50% of the installed cost of any project.

CHP proposals must show savings in one or more of the following areas: energy usage, energy demand, emissions, and water use. These savings will be estimated by comparing a baseline with and without the measures.

**Annual Funding Available**

- \$350,000 total available annually as incentives
- \$22,000 total available annually for funding of energy/design studies by consultants

**Program Limitations and Information**

This program will be limited to Southwest Gas Arizona customers. Southwest Gas Key Account Management engineers or its contractors may work with the customer or customer's consultants to prepare preliminary economic studies and environmental assessments to determine the feasibility of CHP projects.

**Measurement and Evaluation**

Southwest Gas Key Account Management Supervision will verify energy savings and demand reductions.

**Information**

Contact Brian O'Donnell (602-395-4058) at Southwest Gas for more information.

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Interested in a free energy consultation from Southwest Gas? Please call your IGE or our hotline at 702-364-3063.


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## Which State Uses the Most Natural Gas?

The state of Texas was the nation's leading consumer of natural gas in 2008 at more than 3.1 trillion cubic feet, according to the U.S. Department of Energy. The state of Hawaii used the least amount at only 2.8 billion cubic of consumption. The nation as a whole used more than 21 trillion cubic feet. Nationwide, an estimated 30% of total consumption was used in the industrial section, while home use accounted for 23% and commercial businesses for 15%. The remainder was used for electrical generation and vehicle fuel.

The following table lists the total consumption of the 10 largest natural gas consuming states in 2008.

State	Natural Gas Consumption (In Billion Cubic Feet)
Texas	3,151
California	2,326
New York	1,162
Louisiana	1,084
Illinois	979
Florida	938
Michigan	793
Ohio	777
Pennsylvania	704
New Jersey	618

Source: U.S. Department of Energy, Energy Information Administration

**Complimentary Energy Consultation**

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See the U.S. Department of Energy's [Natural Gas Navigator](#) to find the natural gas consumption in other states.

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Natural gas appliances can not only help sell a home, but also have a low carbon footprint.

Find out how to [lower your natural gas use](#) with quick and easy energy-saving tips.

# **Appendix B**

## **APPENDIX B**

### **Survey Results**

# **Southwest Gas Technology Information Center Survey Results**

***Published: 3/19/2009***

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## **Survey Overview**

### **Description**

We hope you are enjoying your free subscription to the Southwest Gas Energy Line newsletter and find it valuable. Please complete the following survey, which should take no more than 10 minutes. Your responses will be kept confidential, and the information you provide will help us improve Energy Line.

### **Instructions Provided To Respondents**

We hope you are enjoying your free subscription to the Southwest Gas Energy Line newsletter and find it valuable. Please complete the following survey, which should take no more than 10 minutes. Your responses will be kept confidential, and the information you provide will help us improve Energy Line.

### **Respondent Metrics**

Respondents:	23
First Response:	2/26/2009 05:04 PM
Last Response:	3/16/2009 11:30 AM



## Survey Results

The following is a tabular depiction of the responses to each survey question. Additional comments provided by respondents, if any, are included after each table.

### Section - 1

#### 1. What is your position within your company?

43.5%	10	Facilities Manager
13.0%	3	Energy Manager
13.0%	3	Other:
13.0%	3	Owner/President/CEO
8.7%	2	Operations Manager
4.3%	1	Maintenance Supervisor
4.3%	1	Staff Engineer

#### Comments/Notes for "Other:"

COST ANALYST (GREG STELZNER, ME GLOBAL ELEC METAL)  
 Energy Analyst (Matt Karber, Maricopa County Facilities Management)  
 service mechanic (ROBERT AALBREGTSE, CLEAN ENERGY FUELS)

**Section - 2****2. Have you noticed the monthly Energy Line (formerly GasLine) newsletter in your mailbox?**

87.0%	20	Yes
13.0%	3	No

**Section - 3****3. If Yes, how often do you open the Energy Line email?**

40.0%	8	Every time
40.0%	8	Whenever I see a topic I am interested in
20.0%	4	Occasionally

**Section - 4**

**4. If you read Energy Line, how valuable to you is the information presented?**

55.0%	11	Somewhat valuable
45.0%	9	Very valuable

**Section - 5**

**5. If you read Energy Line, how helpful is the information in making energy decisions?**

70.0%	14	Somewhat helpful
30.0%	6	Very helpful

**Section - 6**

**6. Have you ever passed along information found in Energy Line to others in your company involved in making energy decisions?**

80.0%	16	Yes
20.0%	4	No

**Section - 7****7. Who else within your company should receive Energy Line? Check all that apply.**

28.6%	6	Maintenance Supervisor
19.0%	4	Energy Manager
19.0%	4	Operations Manager
9.5%	2	Facilities Manager
9.5%	2	Purchasing Manager
9.5%	2	Staff Engineer
4.8%	1	Other:

**Comments/Notes:**

Associates (Robert Baltes, Baltes Distributed Generation)

<b>Section - 8</b>
--------------------

**8. What types of energy-related topics are you most interested in learning about? Rank them by number with 1 being the topic you are most interested in.**

5.9%	7	Energy Pricing and forecasts #2
5.9%	7	Green Energy/Alternative Energy #4
5.0%	6	Energy-saving technology/equipment #1
5.0%	6	Energy-saving technology/equipment #2
4.2%	5	Energy Management/Controls #1
4.2%	5	Energy Management/Controls #3
4.2%	5	Rate information #3
3.4%	4	Energy Management/Controls #4
3.4%	4	Energy Pricing and forecasts #3
3.4%	4	Equipment maintenance #3
3.4%	4	Equipment maintenance #4
3.4%	4	Rate information #1
3.4%	4	Rate information #6
2.5%	3	Energy Management/Controls #2
2.5%	3	Energy Pricing and forecasts #1
2.5%	3	Energy Pricing and forecasts #4
2.5%	3	Equipment maintenance #5
2.5%	3	Green Energy/Alternative Energy #2
2.5%	3	Green Energy/Alternative Energy #6
2.5%	3	None of the Above #8
2.5%	3	Rate information #2
1.7%	2	Energy Pricing and forecasts #5
1.7%	2	Energy-saving technology/equipment #3
1.7%	2	Energy-saving technology/equipment #4
1.7%	2	Energy-saving technology/equipment #5
1.7%	2	Green Energy/Alternative Energy #1
1.7%	2	Green Energy/Alternative Energy #3
1.7%	2	Green Energy/Alternative Energy #5
1.7%	2	Power quality #4
1.7%	2	Power quality #5
1.7%	2	Power quality #6
1.7%	2	Power quality #7
0.8%	1	Energy Management/Controls #7
0.8%	1	Energy Pricing and forecasts #7
0.8%	1	Energy-saving technology/equipment #7
0.8%	1	Equipment maintenance #1
0.8%	1	Equipment maintenance #6
0.8%	1	Green Energy/Alternative Energy #7



3/19/2009

13

0.8%	1	Power quality #1
0.8%	1	Rate information #5

**Section - 9**

**9. Has your company taken any steps to improve energy efficiency as a result of any information provided in Energy Line?**

52.2%	12	Yes
26.1%	6	Not Sure
21.7%	5	No

**Section - 10**

**10. Who in your company is most responsible for major energy decisions (such as process changes, purchases of new types of equipment, etc.)?**

43.5%	10	That person is me
21.7%	5	Facilities Manager
17.4%	4	Operations Manager
8.7%	2	Energy Manager
8.7%	2	Owner/President/CEO

**Section - 11****11. Who is most responsible for reviewing monthly energy bills to determine if they appear reasonable?**

60.9%	14	That person is me
13.0%	3	Accounts Payable Manager
13.0%	3	Facilities Manager
8.7%	2	Energy Manager
4.3%	1	Owner/President/CEO

**Section - 12**

**12. Who is most responsible for recommending replacement equipment or processes that are more energy efficient than currently in use by your company?**

73.9%	17	That person is me
13.0%	3	Facilities Manager
8.7%	2	Energy Manager
4.3%	1	Maintenance Supervisor

**Section - 13**

**13. How often are major, non-emergency energy decisions made by your company? (Such as replacement of equipment; additions of new equipment, changes in or additions to current processes, etc.)**

65.2%	15	Annually
17.4%	4	Monthly
13.0%	3	Weekly
4.3%	1	Less often than Annually

**Section - 14****14. How far in advance of implementation are major non-emergency energy decisions made?**

52.2%	12	Two to 11 months
39.1%	9	12 - 24 months
4.3%	1	More than 24 months
4.3%	1	One month or less

**Section - 15****15. During your annual budgeting process, how do you project annual energy costs? (choose one)**

59.1%	13	Review previous years' energy costs and add an escalation factor
27.3%	6	Perform an internal energy audit and use it to estimate future costs
9.1%	2	Other:
4.5%	1	"Guesstimate"

**Comments/Notes for "Other:"**

Regional Energy Manager (Steve Craft, Marriotts Canyon Villas)

Talk with my account reps (Jeff Clark, Hyatt Regency Phoenix)



**Section - 16****16. Which of the following energy-related changes do you anticipate that your company might implement during the next two years?**

28.8%	15	Replacing or upgrading existing equipment
19.2%	10	Upgrading a current process
17.3%	9	Adding new equipment
15.4%	8	Remodeling existing building
7.7%	4	Adding a new process
7.7%	4	Other:
3.8%	2	Moving to a new location

**Comments/Notes:**

Adding another facility (Eric Dumont, Specialty Textile Services)  
expand EMS process and capabilities (Jeff Clark, Hyatt Regency Phoenix)  
Green Products (Bob Huling, ASU West campus)  
uncertain yet (James Hrusovszky, United Dairymen of Arizona)

**Section - 17****17. If Southwest Gas were to offer energy-efficiency programs, which types may be of interest to you?**

21.5%	14	Equipment replacement
16.9%	11	Combined heat and power
16.9%	11	Peak shaving
10.8%	7	Distribution generation
10.8%	7	Fuel Cells
10.8%	7	Microturbines
6.2%	4	Engines
4.6%	3	Cooking technologies
1.5%	1	Other:

**Comments/Notes:**

price hedging (Gary Phelps, Anderson Clayton Corp)

**Section - 18**

**18. Free energy consultations are available from Southwest Gas. Would your company like to see what money-saving, energy efficiency opportunities exist at your facility?**

78.3%	18	Yes
21.7%	5	No

**Section - 19****19. How soon would you like a free energy consultation from Southwest Gas?**

72.2%	13	Within a month
11.1%	2	Immediately
11.1%	2	Next year
5.6%	1	Within six years

# Appendix C

## **APPENDIX C**

### **Bill Comparison Data**

**SOUTHWEST GAS CORPORATION  
TECHNOLOGY INFORMATION CENTER PROGRAM  
ANNUAL THERM USAGE  
2007-2008 COMPARISON  
JANUARY - DECEMBER**

<b>CUSTOMER NUMBER</b>	<b>2007</b>	<b>2008</b>	<b>THERM SAVINGS</b>
1	941,712	921,016	(20,696)
2	876,769	596,117	(280,652)
3	67,369	6,637	(60,732)
4	249,995	139,787	(110,208)
5	109,091	98,787	(10,304)
6	880,247	944,081	63,834
7	359,426	322,729	(36,697)
8	38,573	41,939	3,366
9	617,361	625,024	7,663
10	105,557	151,802	46,245
11	306,799	4,885	(301,914)
12	304,168	319,030	14,862
13	322,284	182,972	(139,312)
14	187,414	112,946	(74,468)
15	159,043	149,261	(9,782)
16	1,066,744	948,095	(118,649)
17	116,024	109,867	(6,157)
18	209,918	192,070	(17,848)
<b>TOTAL USAGE</b>	<b>6,918,494</b>	<b>5,867,045</b>	<b>(1,051,449)</b>

**SOUTHWEST GAS CORPORATION  
TECHNOLOGY INFORMATION CENTER PROGRAM  
ANNUAL THERM USAGE  
2008-2009 COMPARISON  
JANUARY - JULY\***

<b>CUSTOMER NUMBER</b>	<b>2008</b>	<b>2009</b>	<b>THERM SAVINGS</b>
1	556,314	592,765	36,451
2	305,417	445,984	140,567
3	4,092	3,315	(777)
4	49,129	158,682	109,553
5	65,643	57,591	(8,052)
6	587,840	622,036	34,196
7	220,075	196,640	(23,435)
8	28,378	28,872	494
9	411,719	348,490	(63,229)
10	88,410	95,971	7,561
11	209,524	197,889	(11,635)
12	129,222	80,570	(48,652)
13	76,518	36,208	(40,310)
14	92,590	79,947	(12,643)
15	636,591	502,337	(134,254)
16	66,751	62,704	(4,047)
17	115,500	116,181	681
<b>TOTAL USAGE</b>	<b>3,643,713</b>	<b>3,626,182</b>	<b>(17,531)</b>

• Data was only available through July 30, 2009, at the time of this filing.  
Usage data was compared using the same time period for 2008 for this chart.